

We Claim:

1. A spark plug comprising:

a central electrode;

a metal shell;

5 an alumina ceramic insulator disposed between the center electrode and the metal shell, wherein at least part of the surface of the insulator is covered with a glaze layer comprising oxides,

wherein the glaze layer comprises:

10 1 mol% or less of a Pb component in terms of PbO;

35 to 55 mol% of a Si component in terms of SiO<sub>2</sub>;

15 to 35 mol% of a B component in terms of B<sub>2</sub>O<sub>3</sub>;

5 to 20 mol% of a Zn component in terms of ZnO;

0.5 to 20 mol% in total of at least one of Ba and Sr components

15 in terms of BaO and SrO, respectively; and

10 to 15 mol% in total of at least one of alkaline metal components of Na, K, and Li in terms of Na<sub>2</sub>O, K<sub>2</sub>O, and Li<sub>2</sub>, respectively.

20 2. The spark plug according to claim 1, wherein the glaze layer contains the K component and at least two alkaline metal components among the Li, Na and K components, and satisfies the relationship:  $0.4 < NK_2O/NR_2O < 0.8$  when the at least two alkaline metals are taken as R, NR<sub>2</sub>O is a total mol content of

25 the at least two alkaline metal components in terms of a

composition formula  $R_2O$ , and  $NK_2O$  is a mol content of the K component in terms of  $K_2O$ .

3. The spark plug according to claim 1, wherein the glaze layer contains the Li component and at least two alkaline metal components among the Li, Na and K components, and satisfies the relationship:  $0.2 < NLi_2O/NR_2O < 0.5$  when the at least two alkaline metal components are taken as R,  $NR_2O$  is a total mol content of the at least two alkaline metals in terms of a composition formula  $R_2O$ , and  $NLi_2O$  is a mol content of the Li component in terms of  $Li_2O$ .

4. The spark plug according to claim 1, wherein the glaze layer further comprises a B component and a Zn component in terms of  $B_2O_3$  and  $ZnO$ , respectively, in a total mol amount of  $N(B_2O_3 + ZnO)$ ,

the glaze layer further comprises at least one of: an alkaline earth metal component RE, RE being at least one selected from Ba, Mg, Ca and Sr, in terms of a composition formula  $REO$ ; and an alkaline metal component R, R being at least one selected from Na, K and Li, in terms of a composition formula  $R_2O$ , in a total mol amount of  $N(RO + R_2O)$ , and

the ratio:  $N(B_2O_3 + ZnO)/N(RO + R_2O)$  is 1.5 to 3.0.

5. The spark plug according to claim 1, wherein the glaze

layer contains 8 to 30 mol% in total of the Zn component and the at least one of Ba and Sr components in terms of ZnO, BaO and SrO, respectively.

5           6. The spark plug according to claim 1, wherein the glaze layer further comprises 0.5 to 5 mol% in total of at least one of Zr, Ti, Mg, Bi, Sn, Sb and P in terms of ZrO<sub>2</sub>, TiO<sub>2</sub>, MgO, Bi<sub>2</sub>O<sub>3</sub>, SnO<sub>2</sub>, Sb<sub>2</sub>O<sub>5</sub> and P<sub>2</sub>O<sub>5</sub>, respectively.

10           7. The spark plug according to claim 1, which comprises one of: a terminal metal fixture and the center electrode as one body, in a through hole of the insulator; and a terminal metal fixture and the center electrode provided separately from the center electrode via a conductive bonding layer, in a through  
15 hole of the insulator, and

an insulation resistant value is 200 MΩ or more, which is measured by keeping the whole of the spark plug at about 500°C and passing a current between the terminal metal fixture and the metal shell via the insulator.

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8. The spark plug according to claim 1, wherein the insulator comprises an alumina insulating material containing 85 to 98 mol% of an Al component in terms of Al<sub>2</sub>O<sub>3</sub>, and the glaze layer has an average thermal expansion coefficient at the  
25 temperature ranging 20 to 350°C of  $5 \times 10^{-6}/^{\circ}\text{C}$  to  $8.5 \times 10^{-6}/^{\circ}\text{C}$ .

9. The spark plug according to claim 1, wherein the glaze layer has a softening point of 600 to 700°C.